Amendments to the Claims:

This listing of claims will replace all prior versions of claims in the application:

Listing of Claims:

1. (Currently Amended) An apparatus for use in performing a desired activity in an automated, microscale format, comprising:

a) a first substrate having a first workplace defining x-y coordinates;

b) one or more microparticles adapted for controlled movement adjacent said first workplace, each microparticle being adapted for having one or more magnetic or electrostatic dipoles, and one or more of said microparticles having one or more effectors;

c) a plurality of stations located at different known first workplace x-y coordinates, each station being adapted to carry out or participate in one or more selected operations with said microparticle effectors, wherein at least one of said stations includes a chamber for holding a liquid, and a chamber opening through which a microparticle accesses said liquid across a gas/liquid interface;

d) a first driving structure positioned adjacent said first workplace, said driving structure having a plurality of first-structure drive elements selectively energizable to move one or more of said microparticles between selected first workplace x-y coordinates and for moving one or more of said microparticles positioned at a selected station in and out of the station across a gas/liquid interface, through interactions of said drive elements with said microparticles' dipoles; ~~and,~~

e) one or more controllers operatively linked to said first-structure drive elements for energizing said first-structure drive elements to move said one or more selected microparticles between or among selected stations and for moving a microparticle in and out of the selected station, to accomplish said desired activity.

2. (Original) The apparatus of claim 1 further comprising:

a) a second substrate having a second workplace, said second substrate adapted to be placed adjacent said first substrate to form a continuous workplace with expanded x-y coordinates;

b) one or more additional stations being carried on said second substrate; and

c) a second driving structure positioned adjacent said second workplace, and having a plurality of second-structure drive elements selectively energizable to move one or more of said microparticles between selected second workplace x-y coordinates, through interaction of said second-structure drive elements with said microparticles' dipoles,

wherein said controller is operatively linked to said second-structure drive elements for energizing said second-structure drive elements to move one or more selected microparticles between or among selected stations on said second substrate, and said first-structure and second-structure drive elements are energizable to move one or more of said microparticles from one substrate to another.

3. (Currently Amended) The apparatus of claim 1 further comprising:

a) a second substrate having a second workplace having x-y coordinates, said substrate adapted to be placed adjacent said first substrate to augment microparticle movement within said first or second workplace ~~having x-y coordinates~~; and

b) a second driving structure positioned adjacent said second substrate, and having a plurality of second-structure drive elements selectively energizable to move one or more of said microparticles between selected first or second workplace x-y coordinates, through interaction of said second-structure drive elements with said microparticles' dipoles,

wherein said controller is operatively linked to said second-structure drive elements for energizing said second-structure drive elements to move one or more selected microparticles between or among selected stations, and said second-structure

drive elements are energizable to move one or more of said microparticles between said first substrate and said second substrate.

4. (Original) The apparatus of claim 1, wherein said driving structure further includes one or more biasing elements effective to impart vertical, z-dimension forces to microparticles positioned or moving on said substrate, to move one or more selected microparticles to different selected z-axis positions, or to control movement of said microparticles in a z direction.

5. (Currently Cancelled)

6. (Currently Amended) The apparatus of claim 4 ~~5~~, wherein one or more of said driving elements, when energized, move one or more of said microparticles across said gas/liquid interface into and out of said chamber.

7. (Currently Amended) The apparatus of claim 1 ~~5~~, wherein said controller is designed or configured to activate said drive elements to accelerate the microparticles crossing said interface in a gas-to-liquid direction, and to accelerate, then brake the microparticles crossing said interface in a liquid-to-gas direction.

8. (Original) The apparatus of claim 1, wherein said activity is laboratory activity comprising one of chemical synthesis, single- or multi-analyte diagnostics, and high-throughput screening.

9. (Original) The apparatus of claim 1, wherein said stations are adapted to hold one of a chemical reagent, a wash reagent, or biological moiety.

10. (Original) The apparatus of claim 9, wherein said biological moiety comprise one of oligonucleotides, DNA, protein, enzyme, antibody, antigen, cells, and a body fluid of a human or animal.

11. (Original) The apparatus of claim 1, wherein said microparticles comprise surface-attached chemical groups on which chemical compounds can be synthesized.

12. (Original) The apparatus of claim 1, for use in a method that relies on a binding reaction between first and second compounds or a first compound and a biological cell, wherein at least one of said microparticles has surface attached first compound, and at least one of said laboratory stations contains said second compound, or biological moieties.

13. (Original) The apparatus of claim 1, for transferring material from one station to another, wherein one or more of said microparticles includes an effector for picking up and carrying such material from one station and for depositing said material at a second station.

14. (Original) The apparatus of claim 1, wherein one or more of said microparticles are adapted for moving in a levitated state.

15. (Original) The apparatus of claim 14 further comprising one or more diamagnetic layers defining a levitation surface wherein said microparticles are adapted to stably levitate by diamagnetic levitation.

16. (Original) The apparatus of claim 14 wherein said levitated state results wholly or in-part from electrostatic levitation, buoyant levitation, or surface tension levitation.

17. (Original) The apparatus of claim 14 further comprising one or more biasing elements for causing said microparticles to move toward or away from said biasing elements.

18-35 (Canceled)

36. (Original) An apparatus for use in performing one or more desired laboratory activities in an automated, microscale format, comprising:

a) a first substrate having a workplace defining x-y coordinates;

b) one or more microparticles adapted to levitate adjacent said workplace, said microparticles each having a magnetic or electrostatic dipole, and at least one of said microparticles having one or more laboratory effectors;

c) a plurality of laboratory stations located at different known workplace x-y coordinates, each laboratory station being adapted to carry out or participate in one or more selected laboratory operations with said microparticle;

d) a driving structure positioned adjacent said workplace, said driving structure having a plurality of drive elements selectively energizable to move one or more of said microparticles between selected workplace x-y coordinates, with said microparticles in a levitated state, through interactions of said drive elements with said microparticles' dipoles; and

e) a controller operatively linked to said drive elements for energizing said drive elements to move said one or more selected microparticles between or among selected laboratory stations to accomplish said desired one or more laboratory activities.

37. (Currently Amended) An apparatus for use in performing one or more desired activities in an automated, microscale format, comprising:

a) a first substrate having a workplace defining x-y coordinates;

b) one or more microparticles adapted to levitate adjacent said workplace, said microparticles each having a magnetic or electrostatic dipole, and at least one of said microparticles having one or more effectors;

c) a plurality of ~~laboratory~~ stations located at different known workplace x-y coordinates, each station being adapted to carry out or participate in one or more selected operations with said microparticle, wherein at least one of said stations includes a chamber for holding a liquid, and a chamber opening through which a microparticle accesses said liquid across a gas/liquid interface;

d) a driving structure positioned adjacent said workplace, said driving structure having a plurality of drive elements selectively energizable to move one or more of said microparticles between selected workplace x-y coordinates and for moving a microparticle positioned at a selected station in and out of the station across a gas/liquid interface, with said microparticles in a levitated state, through interactions of said drive elements with said microparticles' dipoles; and

e) a controller operatively linked to said drive elements for energizing said drive elements to move said one or more selected microparticles between or among selected stations and for moving a microparticle in and out of a selected station, to accomplish said desired one or more activities.

38. (Original) The apparatus of claim 37, wherein said first substrate has a diamagnetic layer, said one or more microparticles are magnetic microparticles, and said microparticles levitate adjacent said workplace by diamagnetic levitation.

39. (Original) The apparatus of claim 37, wherein said substrate is adapted to support a layer of fluid in which said microparticles are buoyant, and said microparticles levitate adjacent said workplace by buoyancy.

40. (Original) The apparatus of claim 37, wherein said substrate is adapted to support a layer of fluid having a surface displaying surface tension upon which said microparticles are supported against.

41. (Original) The apparatus of claim 40, wherein said microparticles have a density greater than that of said fluid, and said surface tension is sufficient to support said microparticle above said surface.

42. (Original) The apparatus of claim 40 wherein said microparticles have a density greater than that of said fluid, and said surface tension is sufficient to retain said microparticles below said surface when upwardly biased.

43. (Original) The apparatus of claim 37 further comprising:

a) a second substrate having a second workplace, said second substrate adapted to be placed adjacent said first substrate to form a continuous workplace with expanded x-y coordinates;

b) additional ~~laboratory~~ stations carried on said second substrate; and

c) a second driving structure positioned adjacent said second workplace, and having a plurality of second-structure drive elements selectively energizable to move one or more of said microparticles between selected second workplace x-y coordinates, with said microparticles in a levitated state, through interaction of said second-structure drive elements with said microparticles' dipoles,

wherein said controller is operatively linked to said second-structure drive elements for energizing said second-structure drive elements to move one or more selected microparticles between or among selected ~~laboratory~~ stations on said second substrate, and said drive elements of said two drive structures are energizable to move microparticles from one substrate to another.

44. (Currently Amended) The apparatus of claim 37 further comprising:

a) a second substrate having a second workplace having x-y coordinates, said substrate adapted to be placed adjacent said first substrate to augment microparticle levitation within said first or second workplace ~~having x-y coordinates~~; and

b) a second driving structure positioned adjacent said second substrate, and having a plurality of second-structure drive elements selectively energizable to move one or more of said microparticles between selected first or second workplace x-y coordinates, with said microparticles in a levitated state, through interaction of said second-structure drive elements with said microparticles' dipoles,

wherein said controller is operatively linked to said second-structure drive elements for energizing said second-structure drive elements to move one or more selected microparticles between or among selected ~~laboratory~~ stations, and said second-structure drive elements are energizable to move microparticles between said first substrate and said second substrate.

45. (Original) The apparatus of claim 37, wherein said driving structure further includes one or more biasing elements effective to impart vertical, z-dimension forces to microparticles levitating on said substrate, to move one or more selected microparticles to different selected z-axis positions, or to control movement of said microparticles in a z direction.

46. (Currently Cancelled)

47. (Currently Amended) The apparatus of claim ~~46~~ 45, wherein one or more of said driving elements, when energized, move one or more of said microparticles across said gas/liquid interface into and out of said chamber.

48. (Currently Amended) The apparatus of claim ~~46~~ 37, wherein the controller is designed or configured to activate the drive elements to accelerate microparticles

crossing said interface in a gas-to-liquid direction and to accelerate, then brake microparticles crossing said interface in a liquid-to-gas direction.

49. (Currently Amended) The apparatus of claim ~~46~~ 37, wherein said activity is a laboratory activity comprising one of chemical synthesis, single- or multi-analyte diagnostics, and high-throughput screening.

50. (Currently Amended) The apparatus of claim ~~46~~ 37, wherein said ~~laboratory~~ stations are adapted to hold one of a chemical reagent, a wash reagent, or biological moiety.

51. (Original) The apparatus of claim 50, wherein said biological moiety comprises one of oligonucleotides, DNA, protein, enzyme, antibody, antigen, cells, and a body fluid of a human or animal.

52-65 (Cancelled)

66. (Currently Amended) An apparatus for exposing a magnetic microparticle to a plurality of liquids, comprising:

a) a diamagnetic substrate having a workplace defining x-y coordinates, and for levitation of ~~on which~~ said microparticle ~~can levitate~~;

b) a plurality of stations located at different known workplace x-y coordinates, each station having a chamber for holding a selected liquid, and a chamber opening forming a gas/liquid interface when said chamber contains such liquid, each station being adapted to carry out or participate in one or more selected operations;

c) a driving structure positioned adjacent said workplace, said driving structure having (i) a first set of drive elements selectively energizable to cause an interaction between selected energized drive elements and one or more selected microparticles, to move said microparticles between selected workplace x-y coordinates, with said

microparticles in a levitated state, through interaction of said drive element with said microparticles' dipoles, and (ii) a second set of drive elements associated with each station, selectively energizable to cause an interaction between selected energized drive elements and one or more selected microparticles, to move said microparticles across said gas/liquid interfaces at said ~~laboratory~~ stations; and

d) a controller operatively linked to said first and second sets of drive elements for energizing said first and second sets of drive elements to move said one or more selected microparticles between or among selected ~~laboratory~~ stations, and in and out of ~~laboratory~~ stations, to accomplish ~~said~~ a desired laboratory-activity.

67. (Currently Amended) The apparatus of claim 66, wherein said ~~laboratory~~ stations are substantially in-plane with said x-y movement of said microparticles on said substrate, and said chamber opening includes a capillary port communicating between interior of said chamber and said workplace.

68. (Original) The apparatus of claim 66, wherein said second set of drive elements includes, for each station, an exterior drive element on said external side of said station's port, and an internal drive element on said internal side of said station's port.

69. (Currently Amended) The apparatus of claim ~~66~~ 68, wherein said interior and exterior drive elements each includes first and second electromagnetic coils disposed on opposite lateral sides of said capillary port.

70. (Original) The apparatus of claim 68, wherein said interior drive element associated with each station is energizable to move said microparticles into said chamber, and said exterior drive element associated with each station is energizable to move said microparticles out of said chamber.

71-74. (Currently Cancelled)

75. (Currently Amended) The apparatus of claim 66 wherein one of more said ~~laboratory~~ stations has one or more chambers, each chamber separated from other chambers by a capillary port designed or configured to contain a gas and defines a gas/liquid interface between each chamber and said capillary port, when said chambers are filled in liquid.

76. (Original) The apparatus of claim 75, wherein a plurality of laboratory stations are arranged in a hub-and-spoke arrangement comprising a central station having a chamber with one or more central station connecting ports, and radial-spoke stations, one or more of said spoke stations having a chamber and one or more connecting ports, at least one of said spoke station connecting ports, and said hub station connecting ports having a capillary segment intended to contain a gas and define a gas/liquid interface between each chamber and said capillary port, when said chambers are filled with a liquid.

77. (Original) The apparatus of claim 66, wherein said chamber is defined by a cavity formed in said substrate, said chamber opening is formed by an upper surface of liquid contained in said cavity, and said second set of drive elements are energizable to move said microparticles in a substantially z direction across said gas/liquid interface into and out of said chamber.

78. (Original) The apparatus of claim 77, wherein said second set of drive elements associated with such cavity-defined chamber include, exterior and interior drive elements disposed on exterior and interior sides of said chamber opening, respectively.

79. (Cancelled)

80. (Original) An apparatus for use in performing multi-particle operations, comprising:

a) a substrate having a workplace defining x-y coordinates;

b) a plurality of microparticles adapted to levitate adjacent said workplace, said microparticles each having a magnetic dipole;

c) a driving structure positioned adjacent said workplace, said driving structure having a plurality of drive elements selectively energizable to move a linear train of selected microparticles coordinately between selected workplace x-y coordinates, with said microparticles in a levitated state, through interactions of said drive elements with said microparticles' dipoles; and

d) a controller operatively linked to said drive elements for energizing said drive elements to move said microparticles between or among selected x, y coordinates to accomplish said multi-particle operation.

81. (Original) The apparatus of claim 80, wherein said microparticles in said train are magnetically coupled in a direction of train movement.

82. (Original) The apparatus of claim 80, wherein said microparticles in said train are magnetically uncoupled in a direction of train movement.

83. (Original) The apparatus of claim 80, wherein said controller is designed or configured to add or remove selected microparticles to said train, as said train is moved from one region on said workplace to another.

84. (Cancelled)

85-90. (Currently Cancelled)